

[54] **MUSICAL KEYBOARD**

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[56] **References Cited**

UNITED STATES PATENTS

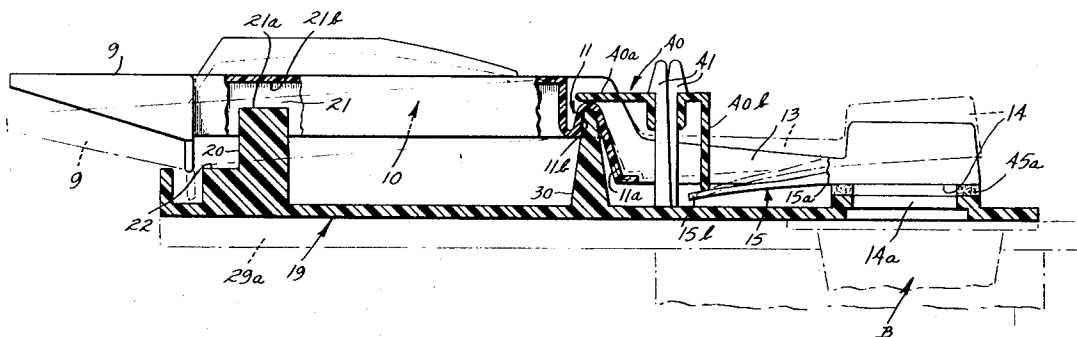
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[57] **ABSTRACT**

A musical keyboard which includes at least one single molded baseplate and a fulcrum extending upwardly from the baseplate near the mid-portion thereof. A predetermined number of single molded keys are cooperatively associated with the base plate, each key including a body having a substantially inverted V-shaped groove located on the bottom surface of the body near its mid-section for pivotal contact with the fulcrum, and a tongue extending from the terminal portion of the body, said tongue having a free end located in proximity to the inverted V-shaped groove. Means are provided for holding the key in a desired predetermined rest position wherein a pre-loaded stress is placed upon the tongue for providing the necessary tension to hold the key in a static position and for causing the key to be returned to said static position upon a release thereof from a finger-depressed position.

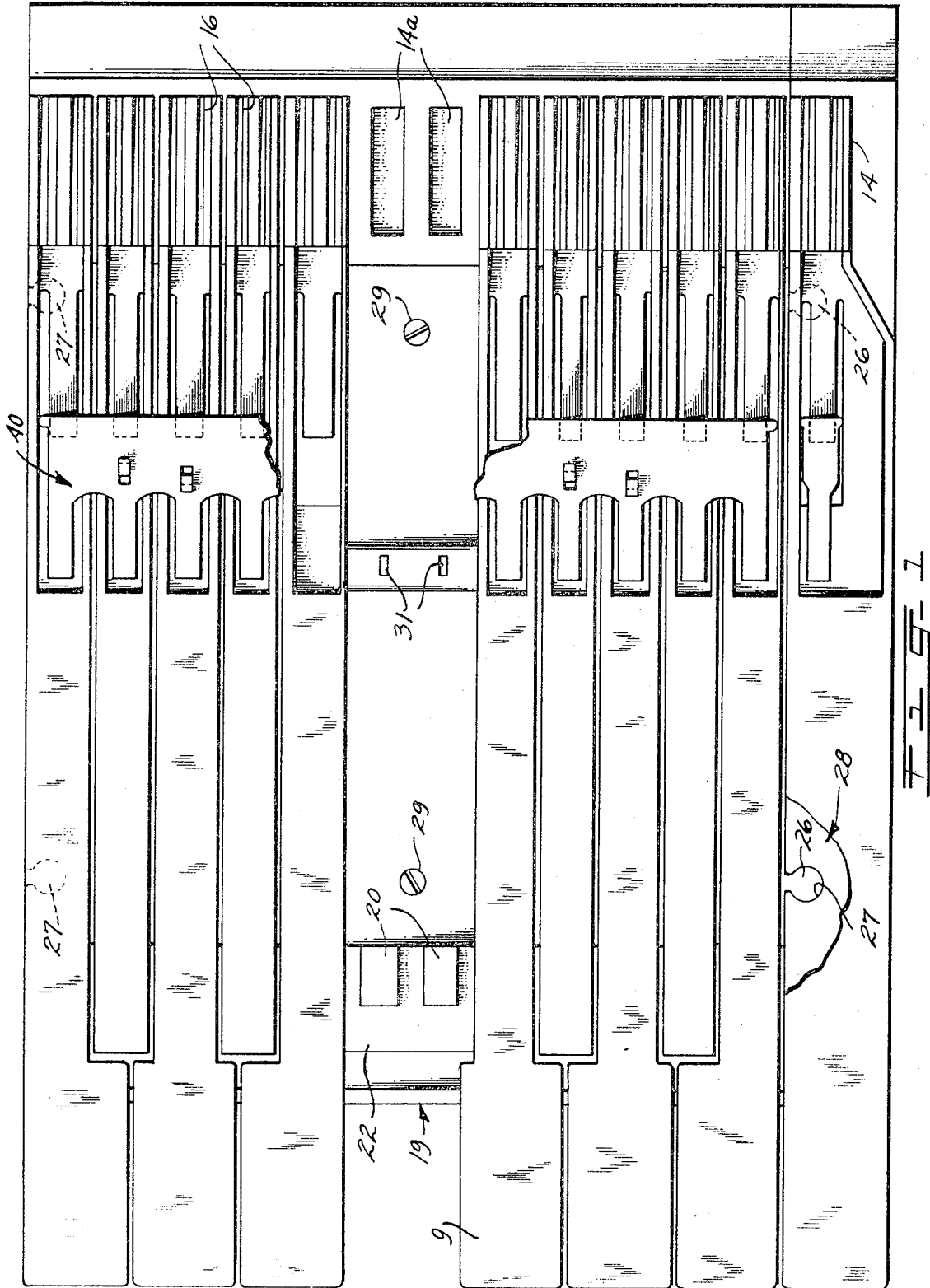
12 Claims, 4 Drawing Figures

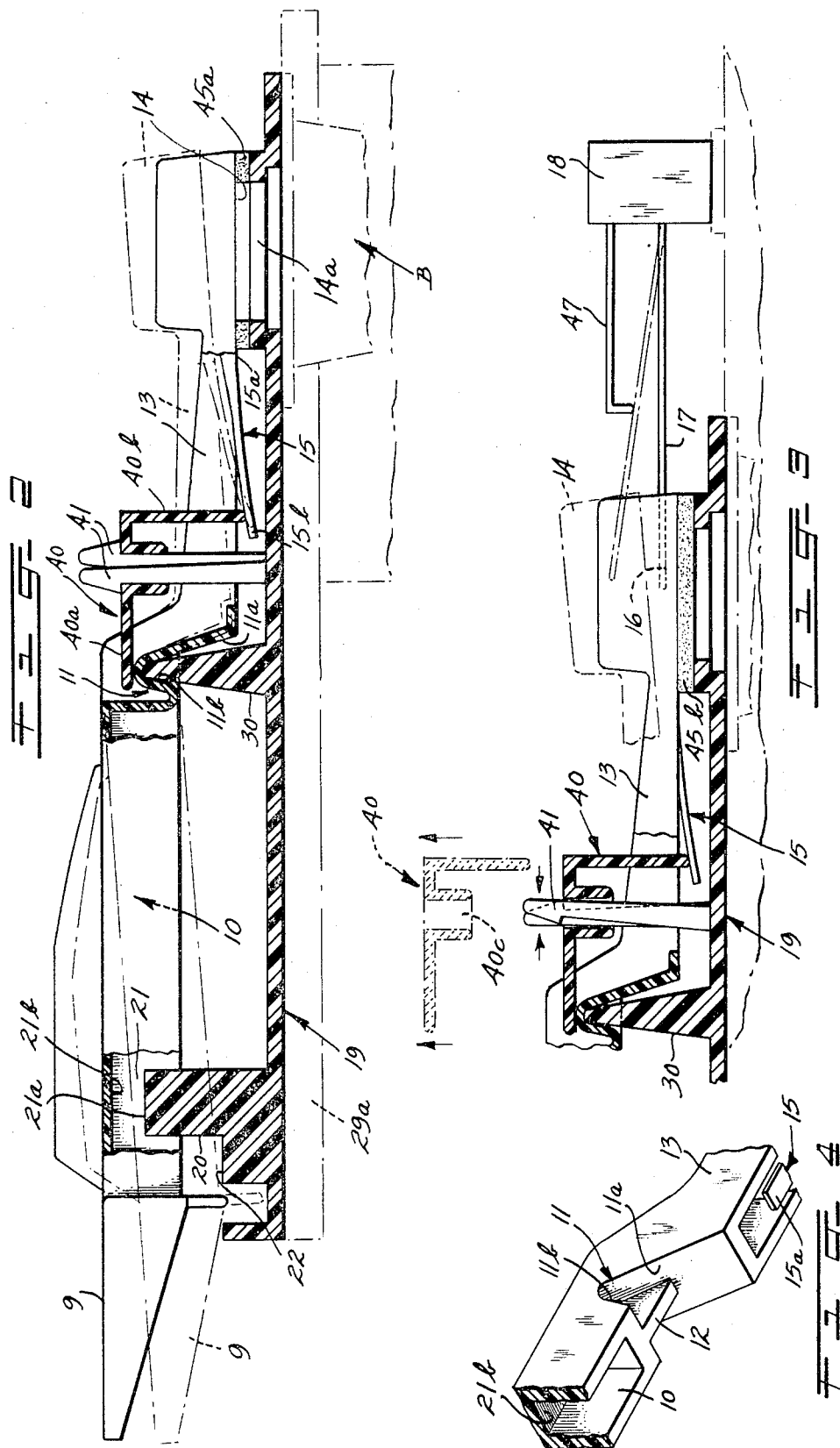


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MUSICAL KEYBOARD

BACKGROUND OF THE INVENTION

This invention relates to musical keyboards, and more particularly to musical keyboards utilized on instruments, such as pianos, organs, chord organs and electronic pianos, organs, chord organs and the like.

In the prior art, keyboards together with the keys thereon were constructed in such a manner that multiple components were required in either their fabrication or their operation or both. For example, in our co-pending application, U.S. Ser. No. 94,894, filed Dec. 3, 1970, there is described the use of individual springs for each key as well as a unitary spring unit having a plurality of resilient members cooperatively associated with each key. There also is described in said application a keyboard which employs a common shaft for holding the keys in alignment, each key being pivotally movable about said shaft. However, with such a shaft arrangement, when a single key has to be replaced on the keyboard, the shaft must be withdrawn from the keys thereby resulting in the keys becoming misaligned and randomly placed. Obviously, additional time and labor is necessitated to accurately reorganize and reset the keys in their normal operating position on the keyboard.

Also, prior art keyboards and keys were comprised of different varying structures for electronic organs and pressurized air organs. Thus different molds were required for the various structures which resulted in additional manufacturing costs and labor.

SUMMARY OF THE INVENTION

It is an object of this invention to obviate the above-discussed difficulties of the prior art and to provide a keyboard having a single molded baseplate and single molded keys therefor, each key having an integral resilient member thereon.

It is a further object of this invention to provide a keyboard wherein any individual key can be quickly and easily removed without misaligning any of the remaining keys.

It is still a further object of this invention to provide a keyboard and keys therefor which are adaptable for use on musical instruments, such as chord organs, which employ either pressurized air or electronic circuitry for producing musical sounds.

Broadly, the keyboard includes at least one single molded baseplate having a fulcrum projecting upwardly from the baseplate near the mid-portion thereof. A plurality of single molded keys are provided for the keyboard, each key including a body having a finger depressing portion which extends towards the mid-section thereof, a pair of side rails extending from said body mid-section towards the terminal portion of the body whereat a peripheral seal is located, a substantially inverted V-shaped groove located on the bottom surface of the body near said mid-section for pivotal contact with the fulcrum, and a tongue located between the side rails and extending from the peripheral seal, said tongue having a free end located in proximity to the inverted V-shaped groove. Finally, means are provided for holding the keys in a desired predetermined position wherein a pre-loaded stress is placed upon each tongue to hold the keys in a static position and for causing the keys to be returned to said static

position upon a release thereof from finger-depressed positions.

DRAWINGS

Other objects and a fuller understanding of the invention may be had by referring to the drawings wherein:

FIG. 1 is a cut away plan view of the baseplate and keys therefor, when same are utilized in a pressurized air organ;

FIG. 2 is a cross-sectional side view of the baseplate and key when same are utilized in a pressurized air organ;

FIG. 3 is a cross-sectional side view of the baseplate and key when same are utilized in an electronic organ, said view also depicting the application of force to retaining latches for removal of a holding bracket; and

FIG. 4 is an enlarged isometric view depicting the inverted V-shaped groove and a portion of the bottom surface of the key.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings, there is shown a key molded from a thermoplastic material, such as acrylonitrile butadiene styrene. The formed key (FIG. 2) includes a finger depressing portion 9 which extends towards the mid-portion of the key whereat an inverted rounded V-shaped groove 11 (FIG. 4) is located on the bottom surface thereof. The bottom surface of the key extending towards said mid-portion is of an inverted U-shaped recess 10 for receiving an alignment means to be described later. The inverted V-shaped groove 11 is of a desired angle, generally ranging from about 15° to 45°, preferably 30°, and is provided with a web 12 (FIG. 4) extending downwardly from the mid-point thereof for lending strength to the key and serving as an alignment feature to be described hereinafter. One arm 11a of groove 11 extends downwardly a distance to about twice the length of the other arm 11b, said arm 11a converging with a pair of side rails 13—13 which terminate in a peripheral seal 14, normally located over its respective base-plate opening 14a of a reed box B, through which musical tones emanate when the peripheral seal is in the raised position. The top portion of the peripheral seal 14 (FIGS. 2 and 3) is provided with a pair of channels 16—16 for receiving respective activator leads 17—17 of a microswitch 18, when it is desired to utilize the keys and baseplate in an electronic organ, as described in detail hereinafter.

An integrally formed resilient member or tongue 15 is located between side rails 13—13, said tongue being rooted to key seal 14 at 15a and tapering downwardly in thickness towards its free end 15b. The gradual reduction in thickness of the tongue from its root provides an even distribution of stress therealong, as will become apparent hereinafter, thereby precluding a fracturing of the tongue at its root. Tongue 15 is cooperatively associated with a holding bracket, generally referred to at 40 and described later, for providing the necessary tension thereon during operation of the key.

The keyboard (FIGS. 1 and 2) is comprised of a series of similar baseplates 19, each baseplate representing an octave (with sharps and flats) on the keyboard and, accordingly, having twelve openings 14a—14a in registry with reed box B. Located near the other end of the baseplate is a plurality of square or rectangularly shaped projections 20—20, each projection extending

into its respective inverted U-shaped recess 10 of the key. Each projection 20 extends a height sufficient to form a gap 21 between the top surface 21a of the projection and the bottom surface 21b of the U-shaped recess 10, when the key is in its normal rest position. Each projection is of such a width that it is just slightly smaller than its respective U-shaped recess 10, thereby permitting the key to be movable vertically thereover yet precluding any substantial lateral movement thereof. An elongated gasket 22 is located in proximity to the front portion of the baseplate and extends in front of projections 20—20, the gasket serving as a stop to limit the downward travel of the key when it is depressed to sound a note.

While it is understood that the baseplate may be of a unitary structure, optionally, a plurality of baseplates may be utilized. As such each baseplate is provided with a plurality of male members 26—26 for insertion into respective female receiving members 27—27 located on a succeeding octave baseplate, the terminal baseplate (FIG.1) being comprised of a single key receiving unit 28 having one lateral surface provided with female receiving members while the other lateral surface is solely of a linear configuration. It is, of course, understood that the terminal baseplate can be an integral part of its preceding baseplate, if desired. It is now apparent that any number of baseplates corresponding to the desired number of octaves can be utilized. Thus, in the event of any injury to any one portion of any baseplate, one single baseplate can be easily replaced, thereby precluding the replacement of the entire keyboard. For example, the baseplate is provided with predetermined located openings for receiving attaching means, such as screws 29—29, for securing the baseplate to a mounting 29a.

Projecting upwardly from and extending along each baseplate is a triangularly shaped fulcrum 30, preferably having a rounded apex, for pivotal contacting relationship with inverted V-shaped member 11. A plurality of recesses 31—31 are provided in each fulcrum in a predetermined spaced relationship to each other, each recess being provided for reception of its respective key web 12. With such a recess-web relationship, there not only is a uniform separation of each key throughout the entire length of the keyboard but also a prevention of lateral movement for each and every key.

A unitary holding bracket, generally referred to at 40, extends the length of the keyboard and is provided with a horizontally extending arm 40a, a vertically disposed arm 40b and a post opening 40c for receiving a pair of conventional twist type retaining latches 41—41 or, optionally, a nut and bolt arrangement for holding the bracket in position. When the bracket is in its normal hold down position, arm 40a is in contact with the top surface of the inverted V-shaped groove 11 and arm 40b is in contact with tongue 15 so as to exert a sufficient force thereon to preload the tongue under tension. Bracket 40 is so secured that arm 40a exerts a minimal force on the top surface of inverted V-shaped groove 11 to hold the keys in position against the fulcrum, yet is capable of permitting the key to pivot during its operation.

Broadly, in operation, for either the pressurized air organ or electronic organ, as the key is depressed to produce a musical tone, it pivots about the fulcrum and, in turn, tongue 15 slides beneath the end portion

of arm 40b towards its free end 15b, thereby placing the key under sufficient tension for its return when the operator releases his hand from the key. Unexpectedly, the tension decreases as the key is depressed since the free end of the tongue nears the end portion 40b to provide a stress over a greater length of the tongue. Finally, when the key is released, the key and relative position of the tongue and arm end 40b return to their normal rest positions.

In the event it is desired to utilize the keys and baseplate with a conventional pressurized air organ, as seen in FIG. 2, a conventional type gasket 45a, composed of a material such as rubber, plastic or the like, is located on the top of the baseplate, said gasket having openings for registry with baseplate openings 14a—14a and a body portion for enveloping said baseplate openings to preclude any emission of sound therethrough when the peripheral seals 14—14 are in their respective closed positions.

In the event it is desired to utilize the keys and baseplate with a conventional electronic organ, as seen in FIG.3, a gasket 45b composed of a similar material as gasket 45a is provided. However, gasket 45b is comprised of a solid body without any openings, thereby causing baseplate openings 14a—14a to be blocked to preclude any passage of air therethrough. The keys are so assembled that the top portion of each peripheral seal 14 receives microswitch activator leads 17—17 in its respective channels 16—16. Thus, as the key is depressed, its peripheral seal 14 lifts activator leads 17 thereby causing the latter to contact conducting element 47 to complete a circuit and sound the note electronically by known conventional means. As the key is released, the circuit is deenergized and the peripheral seal is softly returned, since any noise is dampened as the peripheral seal contacts the gasket.

Accordingly, it can be seen that the keyboard and keys of this invention can be utilized in either a pressurized air organ or electronic organ merely by providing a gasket with or without openings as the case may be. Although this invention has been described with a great degree of particularity, it is understood that modifications can be made without departing from the spirit and scope of the invention.

We claim:

1. A musical keyboard, which comprises:

at least one single molded baseplate;

a fulcrum projecting upwardly from the baseplate near the mid-portion of the baseplate;

a predetermined number of keys cooperatively associated with the baseplate, each of said keys being of a single mold and comprising a body having a finger depressing portion which extends towards the mid section thereof, a pair of side rails extending from said body mid-section towards the terminal portion of the body, a substantially inverted V-shaped groove located on the bottom surface of the body near said mid-section for pivotal contact with said fulcrum, and a resilient tongue located between the side rails and integrally extending from the terminal portion of the body, said tongue having a free end located in proximity to the inverted V-shaped groove; and,

means for holding the key in a desired predetermined rest position placing a pre-loaded stress upon the tongue for providing the necessary tension to hold the key in a static position and for causing the key

to be returned to said static position upon a release thereof from a finger-depressed position.

2. A musical keyboard, according to claim 1, wherein the baseplate is provided with a predetermined number of projections corresponding to the number of keys and each key body is provided with a recess on its bottom surface near the finger depressing portion thereof for enveloping said baseplate projection to facilitate alignment of the key with succeeding keys and to substantially limit lateral movement thereof.

3. A musical keyboard, according to claim 2, wherein the fulcrum is provided with a plurality of aligned notches near the apex thereof, and the inverted V-shaped groove of each key is provided with a web for insertion into its respective fulcrum notch to maintain the key in an aligned position.

4. A musical keyboard, according to claim 3, wherein the tongue is rooted near the terminal portion of the key body, the thickness of the tongue gradually decreasing towards its free end for providing an even distribution of stress therealong.

5. A musical keyboard, according to claim 4, which further includes a holding bracket having a body portion removably connected to the baseplate, said body portion having a first arm extending therefrom for holding the inverted V-shaped groove in position with the fulcrum, and a second arm for holding the tongue under a pre-loaded tension, the force provided by each of the arms being such to maintain the key under sufficient tension for movement between said static and depressed positions without causing any misalignment thereof.

6. A musical keyboard, according to claim 5, wherein the holding bracket is comprised of a single molded body and extends transversely over the baseplate keys, said holding bracket being provided with means for connecting same to the baseplate.

7. A musical keyboard, according to claim 5, wherein the baseplate is provided with a plurality of openings for communication with a reed box and, which further includes a gasket located between the keys and baseplate, said gasket having a plurality of openings for registry with the baseplate openings.

8. A musical keyboard, according to claim 5, wherein the key is provided with a peripheral seal having a por-

tion provided with receiving means therein, and the musical keyboard further includes,

a gasket located between the keys and baseplate, an activator for producing electronic musical tones, and

activating means cooperatively associated with the activator and receiving means of the key, said activating means contacting the activator to produce a musical tone when the key is moved to a depressed position.

9. A musical keyboard, a baseplate member, each key of said keyboard comprised of a single molded body having a finger depressing portion which extends towards the mid-section of the body, a pair of side rails extending from said body mid-section towards the terminal portion of the body, a substantially inverted V-shaped groove located on the bottom surface of the body near said mid-section for pivotal contact with said baseplate member, and a resilient tongue integrally extending from the terminal portion between said side rails, the tongue having a free end located in proximity to the inverted V-shaped groove, and means placing said tongue under tension for holding the key in a static position and for causing the key to be returned to said static position upon a release thereof from a finger-depressing position.

10. A musical keyboard, according to claim 9, wherein the thickness of the tongue gradually decreases in thickness towards its free end for providing an even distribution of stress therealong when it is placed under tension.

11. A musical keyboard, according to claim 10, wherein the inverted V-shaped groove is provided with a web for insertion into said baseplate member for maintaining the key in a predetermined relationship therewith.

12. A musical keyboard, according to claim 11, wherein the bottom surface of the key extending towards the mid-section of the key is of an inverted U-shaped configuration for enveloping a projection on the baseplate, thereby limiting substantially any lateral movement of the key when it is cooperatively associated with the baseplate.

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